

**Before the
DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration**

Implementation Plan for the National Spectrum Strategy
Docket No. 230308-0068

**COMMENTS OF
OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA,
PUBLIC KNOWLEDGE, AND THE
SCHOOLS, HEALTH & LIBRARIES BROADBAND COALITION**

The Open Technology Institute at New America, Public Knowledge, and the Schools, Health & Libraries Broadband (SHLB) Coalition, (“OTI, PK and SHLB”) are pleased to submit these comments in response to the National Telecommunications and Information Administration’s (“NTIA”) Notice of Opportunity for Public Input (Notice)¹ on the Implementation of the National Spectrum Strategy (“NSS” or “Strategy”). We strongly agree that the Strategy can “accelerate U.S. leadership in wireless communications and other spectrum-based technologies and to unlock innovations that benefit the American people.”² We specifically support the Administration conclusion that “[d]ynamic spectrum sharing is one key to meet these growing demands, and the United States is uniquely positioned to embrace a whole-of-Nation approach to advance the state of technology for dynamic forms of sharing.” Accordingly, our groups urge NTIA to quickly determine which of the prioritized frequency bands can be shared for Federal and non-Federal use, and to implement an inclusive multi-stakeholder process that pursues a goal of open, widespread and intensive sharing of unused spectrum capacity.

Last April OTI, PK and SHLB, along with other public interest groups, filed extensive comments with NTIA proposing principles for a national spectrum strategy, as well as specific recommendations concerning bands that should be prioritized for study and, in collaboration with the Federal Communications Commission (“FCC”), authorized for coordinated sharing

¹ NTIA, “Notice of Opportunity for Public Input,” Implementation of the National Spectrum Strategy (rel. Nov. 28, 2023) (“Notice”), available at <https://www.ntia.gov/sites/default/files/publications/ntia-nss-implementation-public-notice.pdf>.

² Notice at 2.

among Federal and non-Federal users on an unlicensed, licensed-by-rule, or licensed-by-auction basis.³ Our Public Interest Spectrum Coalition (“PISC”) discussed why a balanced approach that emphasizes intensive band sharing is the most efficient and equitable way forward, as well as the best way to address persistent digital divides. We also proposed an audit of *actual spectrum usage* of both Federal and non-Federal bands and urged the Administration and FCC to adopt a default policy of “use it or share it” with respect to underutilized bands, including bidirectional sharing by Federal agencies of any unused commercial spectrum. We further urged changes to broaden the scope of reimbursements for Federal agencies under the Spectrum Relocation Fund.

We now offer the following suggestions with respect to implementation of the Strategy.

Pillar One: A Spectrum Pipeline

OTI, PK & SHLB support the in-depth study of the five specific bands identified in the NSS, which represent the potential to open an additional 2,790 megahertz for more intensive and productive shared Federal and non-Federal use. **Our primary recommendation is that NTIA prioritize and fast track three of these bands (or sub-bands) for shared Federal and non-Federal use in a far shorter period than the two years the Strategy deems necessary for its study overall.** Among the five bands, three stand out due to pending FCC proceedings or already-completed Federal studies that we believe should allow NTIA, in consultation with incumbent Federal users and the FCC, to agree that the Commission can issue a notice or further notice of proposed rulemaking to more quickly make these underutilized bands widely available for commercial use.

Our groups urge NTIA to adopt a timeline with a goal of a consensus on a sharing framework for these three fast track bands before the end of 2024. The three frequency bands that can be fast-tracked are:

Lower 7 GHz Band (7125-7250 MHz) for Low-Power, Indoor-Only Use: In our comments, PISC emphasized that a balanced pipeline will both anticipate the rapidly expanding need by all Americans for more unlicensed spectrum, but also recognize that this will be most valuable for consumers and the economy as very wide channels contiguous to existing unlicensed bands in the 6 and lower 7 GHz range. PISC observed that “enabling the multi-gigabit

³ Comments of Public Interest Spectrum Coalition, *Development of a National Spectrum Strategy*, NTIA Docket No. 230308-0068 (filed Apr. 17, 2023) (“PISC Comments”).

connectivity and affordability of Wi-Fi 7 applications and use cases in every location—especially in high-traffic settings such as schools, offices and venues—will require additional wide channels of unlicensed access.”⁴ Wi-Fi is the workhorse of the Internet and a vital input to virtually all business and personal productivity. The vast majority of data consumed on smartphones and other mobile devices—more than 80% in the U.S. and Europe—flows over Wi-Fi networks, never touching mobile carrier spectrum or infrastructure.⁵ Accordingly we proposed a goal of making at least 450 megahertz of additional unlicensed spectrum available above and contiguous to the U-NII-8 band (which extends to 7125 MHz).

Although we expect that an allocation of 450 megahertz or more for unlicensed use will be a focus of the overall study of the larger 7150-8400 MHz range identified in the NSS, we recommend that the Implementation Plan prioritize and immediately begin a consultation aimed at authorizing – during 2024 – unlicensed operations in the 7125-7250 MHz on an indoor-only, low-power (LPI) basis. Although this band segment is insufficient to meet the nation’s longer-term need for far more contiguous unlicensed capacity, it can within the next two years enable a fourth 320-megahertz channel for indoor use by next generation Wi-Fi. Separating this lowest sub-band from the larger, more complex study would allow industry to plan for an additional 160 and 320 megahertz-wide channel as Wi-Fi 7 comes to market this year, and as the Wi-Fi 8 standard is developed over the next two years.

We therefore propose that the 7125-7250 MHz band be placed on a separate fast track with a goal of enabling the FCC to adopt a NPRM before then end of 2024. The Federal fixed-link incumbents in this band segment will have exactly the same protection from LPI use as do commercial fixed links in the U-NII-5/7 band segments. No AFC coordination is needed since all use would be restricted to low-power and the indoor-only form factor restrictions the FCC requires for LPI operation in the band just below (e.g., plug-in power only, no weatherization, no external antenna).

With respect to timeline, we propose that the Implementation Plan designate a maximum of four months to consult with Federal agencies with operations in this band segment, followed

⁴ PISC Comments at 5.

⁵ Comcast, “Xfinity Rated as the Fastest Internet Provider Inside and Outside of the Home,” (Jan. 25, 2023), <https://corporate.comcast.com/press/releases/xfinity-ends-2022-rated-fastest-internet-provider#:~:text=Xfinity%20Mobile%20blends%20WiFi%20and,mobile%20traffic%20runs%20over%20WiFi> (“[m]ore than 80 percent of mobile traffic runs over Wi-Fi”).

by a maximum of four months to consult with the FCC on the technical rules and timing for the authorization of low-power, indoor-only access by the both the private and public sector. An expedited decision to make this valuable sub-band available will best serve the public interest and demonstrate tangible progress on the National Spectrum Strategy.

Lower 37 GHz Band (37-37.6 GHz) for Coordinated Federal/Non-Federal Sharing:

The lower 37 GHz band represents another clear opportunity to fast track spectrum that is decidedly not in need of “in-depth study,” but simply requires consultation with impacted agencies (NASA and DoD) and collaboration with the FCC. One reason, as the Strategy acknowledges, is that the FCC has already allocated the band for shared Federal and non-Federal use available under a “co-equal, shared-use framework.”⁶ In its 2016 Spectrum Frontiers Order, the FCC designated a total of 1,850 megahertz across the two millimeter wave bands for auction and set aside 600 megahertz at the bottom of the 37 GHz band to “create a space for both Federal and non-Federal users to share on a coequal basis and set out a process for defining how that sharing will be implemented.”⁷ NTIA supported this outcome.⁸ The Order provides that both Federal and non-Federal users will “access the band through a coordination mechanism, including exploration of potential dynamic sharing through technology in the lower 600 megahertz, which we will more fully develop....”⁹ Moreover, the Commission has been authorizing private ISPs to use the band for fixed point-to-multi-point (PtMP) and for mobile broadband deployments for years, but under Special Temporary Authority (STAs) because of the lack of a general coordination framework.

Accordingly, what’s missing is agreement between NTIA and the FCC on the specific rules and coordination mechanism that can govern coexistence and sharing. There is also a very practical reason to fast track consultation and agreement on this framework: The FCC has an open and pending proceeding that proposes a coordinated sharing framework for fixed and

⁶ Strategy at 7.

⁷ FCC, Report and Order and Further Notice of Proposed Rulemaking, *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, GN Docket No. 14-177, at ¶ 18 (July 14, 2016) (“37 GHz Order & FNPRM”).

⁸ *Id.* at ¶¶ 109-110, citing Letter from Paige R. Atkins, Associate Administrator, Office of Spectrum Management, NTIA to Julius Knapp, Chief, Office of Engineering and Technology, FCC, at 4 (July 12, 2016).

⁹ *Id.* at ¶ 113.

mobile wireless use in the 42-42.5 GHz band that can be used to facilitate both coexistence and some degree of Federal prioritization in the lower 37 GHz band.¹⁰ As our groups stated in our reply comments, the record in that proceeding demonstrates strong support and no apparent opposition to adopting a common coordinated sharing framework across both the 42 GHz and Lower 37 GHz bands, thereby making as much as 1,100 megahertz of spectrum available for flexible use on an open, coordinated basis.¹¹ OTI, PK & SHLB believe that authorizing the two bands under a common coordination framework will encourage deployment, facilitate coexistence, and benefit both private sector and Federal users.

Since the Commission has not yet adopted a coordination framework for the Lower 37 GHz, authorizing a common coordination framework in the 42 GHz proceeding could expedite productive use of both bands. The synergies are substantial, since a common sharing framework could ensure that multiple providers would have access to substantial capacity even if they cannot coordinate co-channel (e.g., using TDD synchronization). More relevant here, the availability of an additional 500 megahertz under a common coordination framework would benefit Federal users that seem reluctant to accept co-primary status in the Lower 37 GHz band if that potentially precludes their access in the future. The flexibility inherent in coordination across 1,100 megahertz by an AFC gives the Commission and NTIA more leeway to agree to give Federal users some form of “**super priority**” status in a portion of the Lower 37 GHz band (e.g., on 37-37.3 GHz). This might be temporary or permanent, depending on the Federal need.

We therefore propose that the 37-37.5 GHz band be placed on a separate fast track with a goal of enabling the FCC to adopt an Order adopting a sharing framework before the end of 2024. With respect to timeline, we propose that the Implementation Plan designate a maximum of three months to consult with Federal agencies with operations in this band segment, followed by a maximum of three months to consult with the FCC on the technical rules and coordination mechanism (e.g., the certification of an automated frequency coordination system).

¹⁰ *Shared Use of the 42-42.5 GHz Band and Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Notice of Proposed Rulemaking, WT Docket No. 23-158, at ¶1 (2023) (“42 GHz NPRM”).

¹¹ *Accord* Comments of NCTA at 6-7; Comments of Charter at 8; Comments of DSA at 3; Comments of Federated Wireless at 2 (all comments filed in response to 42 GHz NPRM, WT Docket No. 23-158, *supra*). *See also* Comments of Qualcomm at 5-6 (supporting use of device-based sensing to coordinate coexistence across both bands).

An expedited decision on the sharing framework for 37-37.5 GHz would allow the Commission to move forward on its pending 42 GHz proceeding without sacrificing the indisputable benefits of a common sharing framework encompassing 1,100 MHz for both Federal and private sector users.

Lower 3 GHz Band (3100-3450 MHz) for Coordinated Federal/Non-Federal Sharing:

In our NSS comments, PISC recommended that the Strategy include a plan to study and make available for at least opportunistic shared use all of the band segments from 2900 to 3450 MHz. We noted that adapting the three-tier CBRS framework and Spectrum Access Systems already operating without interference to U.S. Navy operations is likely the most expeditious and productive way to make Federal radar and other bands below 3450 MHz available for 5G-capable networks and services for a very diverse range of users. And because the Department of Defense has so recently conducted an extensive study (PATHSS), we believe it should be possible for the Administration to fast track the identification of the 3100-3450 MHz band for coordinated sharing. The DOD has concluded the band cannot be cleared for high-power and wide-area exclusive licensing, but could be identified for localized, low-power use on a coordinated shared basis. Such an identification would allow the FCC to invite comment and move forward to authorize private sector use.

Our groups acknowledge, as Assistant Secretary Alan Davidson stated in recent testimony before the House Energy & Commerce Committee, that “there are no easy answers here,”¹² adding that “you're seeing us really redouble our efforts to make sure that we do two different things. Look at spectrum sharing in the band and how we could do that. And also look at whether there's possibility of relocating some systems.”¹³ We agree that further study into “relocating some systems” is worth some delay, since the availability and value of the band for commercial use could be enhanced. At the same time, the Strategy explained that at the conclusion of its multi-stakeholder PATHSS study, “DoD determined that sharing is feasible if certain advanced interference-mitigation features and a coordination framework to facilitate spectrum sharing are put in place.”¹⁴

¹² Transcript of Testimony of Alan Davidson (“Davidson Testimony”).

¹³ Transcript of Testimony of Alan Davidson (“Davidson Testimony”).

¹⁴ Strategy at 6.

Because the lower 3 GHz band spans 350 megahertz with varying degrees of use by DoD systems – and because DoD has already studied the band extensively – we believe that at least a substantial portion of the band can be fast tracked for FCC notice and comment on what sharing framework and coordination mechanism can best promote coexistence and at least localized, low-power shared use. Accordingly, we recommend that the Implementation Plan should address this band on two parallel tracks that leverage work already done as part of the Emerging Mid-Band Radar Spectrum Study (EMBRSS).

First, as the Strategy suggests, NTIA and DoD can study a wider range of Federal bands where military systems do or could operate (e.g., 7 GHz, 4 GHz, 10 GHz) to determine if, as Assistant Davidson testified, it would be feasible and cost-effective to relocate or consolidate any systems that currently rely on the lower 3 GHz band. Since the 7250-8400 MHz band has not been subject to the sort of extensive study conducted as part of the PATHSS process, this track could take 18 months or longer to reach a consensus on specific recommendations.

Second, we recommend that NTIA pursue a separate and more expedited track that builds directly on the PATHSS process and focuses on developing the coordination framework for Federal and non-Federal sharing in the 3100-3450 MHz band. For this purpose, NTIA can begin immediately to collaborate with private sector stakeholders – and in particular with SAS and other dynamic spectrum coordination system (DSMS) providers – to determine what sort of technical rules and coordination mechanisms on both the Federal and commercial side will support the greatest degree of coexistence. DSMS solutions already proven to be effective in enabling sharing in the CBRS and 6 GHz bands can be adapted for the lower 3 GHz band, including automated notification systems, such as scheduling portals and sensing (e.g., the CBRS ESC).

We therefore propose that developing a coordination framework for sharing in the 3100-3450 MHz band should be fast tracked in a process separate from the broader study of whether Federal systems can be relocated or consolidated across bands. Although the EMBRSs findings are not public, it seems very likely that most if not all of the 3100-3450 MHz band cannot be cleared for exclusive licensing, but can accommodate at least low-power and coordinated sharing under a framework similar to CBRS. Accordingly, OTI, PK & SHLB urge NTIA to move forward on a separate track to determine a workable coordination framework for

coexistence and sharing between DoD operations and low-power, shared commercial use. There is no need to wait for an overall study of the potential interplay with other bands.

Bi-Directional Sharing by Federal Agencies: In parallel with the studies, consultations and decisions concerning the five bands targeted by the strategy, our groups encourage the NTIA and FCC to collaborate on a joint policy that authorizes bidirectional sharing of any licensed or unlicensed commercial spectrum band by Federal users on at least an opportunistic basis. As our groups and PISC stated in our comments, an “overlooked need that could be met immediately is periodic or opportunistic access to unused spectrum by the military and other Federal users (e.g., FBI surveillance, 5G on military bases, connectivity in National Parks and other geographically-remote locations).”¹⁵ Our groups have long supported bidirectional sharing between what are largely (and somewhat arbitrarily) considered Federal and commercial bands. Indoor and remote uses of spectrum that is otherwise assigned or licensed are a particularly promising scenario for bidirectional sharing.

We propose that the Implementation Plan include a goal to collaborate with the FCC to authorize and commence a pilot program, by the end of 2024, that allows NTIA to coordinate requests from the military and other Federal agencies for secondary and opportunistic access to *any* licensed commercial bands on a non-interference basis. Access should be conditioned on avoiding harmful interference to incumbents operating in compliance with their license or, in the case of other Federal users, their NTIA assignment. The authorizations should be reasonably specific with respect to frequency range, geographic area, maximum power levels, time and period of use. This collaboration should include a process to track these temporary assignments, along with a requirement that both agencies (and incumbent licensees) are informed of changes in planned use. This tracking and transparency is prudent and useful both to protect incumbents and to optimize the coexistence of new, opportunistic users.

¹⁵ PISC Comments at 30.

Pillar Two: Collaborative Long-Term Planning

OTI and PK strongly support the Administration’s decision to “establish a national spectrum planning process” with a “goal [] to expand opportunities for spectrum access and harmonious coexistence, by whatever licensing or allocation mechanism, for all sectors (e.g., terrestrial, satellite, in-space, launch, aviation, public safety, scientific research, Federal missions).”¹⁶ We particularly applaud the goal of expanding stakeholder consultations and both commercial and nonprofit participation in the study and discussion of mechanisms to “regularly update the Nation’s spectrum strategy,” as well as to promote coexistence and sharing that meet the needs of both Federal and non-Federal spectrum users and evolving use cases. As the Strategy acknowledges, the Commerce Spectrum Management Advisory Committee (CSMAC) is an example, both generally and specifically when it became a vehicle to structure a multi-stakeholder process to develop a consensus on reallocating a large portion of the AWS-3 band for terrestrial mobile use while protecting a diverse range of incumbent Federal agency operations. We also applaud and urge an expansion of recent NTIA and FCC efforts to collaborate with the U.S. Department of the Interior “to encourage the participation of Tribal Nations and the Native Hawaiian community.”¹⁷

The PATHSS process is the most relevant example of how the Administration can convene a multi-stakeholder process to help surface options, tap private sector technical expertise, and advise on the means by which Federal incumbents can share spectrum and coexist with non-Federal users and use cases. However, while the DoD deserves enormous credit for opening its process to private sector input, the PATHSS process was not transparent or inclusive. Nonprofit stakeholders, academic experts and all but the largest and most self-interested corporate interests were effectively excluded from the process, since participation effectively required first becoming eligible to bid on military contracts and joining the National Spectrum Consortium (NSC), a useful but very closed clique of corporate military contractors. For example, New America was encouraged to join the NSC by its primary founder and by DoD officials, but found the costs and other barriers were too high for a relatively small nonprofit. While this qualification process may have aligned with DoD’s normal way of interacting with

¹⁶ National Spectrum Strategy at 10.

¹⁷ Strategy at 9.

the private sector, it fell short of the sort of inclusive, transparent and democratic process that NTIA and the FCC have institutionalized for most policy discussions and debates.

Accordingly, our groups recommend that NTIA establish, as part of the Implementation Plan, a general policy of including nonprofit consumer advocates, academic experts, Tribal Nations, underserved rural and low-income communities, and small business representatives in any multi-stakeholder process related to spectrum allocation, planning and management. Our groups strongly oppose any “pay-to-play” requirement. We recognize that it is common for industry organizations and standard setting bodies to charge fees and dues, and that this practice is not explicitly adopted to exclude consumer advocates and individual academic policy experts. Nevertheless, this was the unfortunate impact of charging for participation in the PATHSS process. A federal process for stakeholder inclusion should not create financial barriers to participation.

As NTIA prepares to distribute more than \$45 billion in Congressional appropriations aimed at making access to high-speed internet access available to all Americans, the persistence of digital divides is reason enough to include the perspectives of advocates for low-income, rural, Tribal and other underserved communities. In addition, large corporate interests that can buy their way into a multi-stakeholder process are often inherently biased toward the status quo and nearsighted when it comes to more open, accessible and low-cost options that don’t fit their current business model.

The most obvious example of this is Wi-Fi, which the big mobile carriers and their equipment and chip OEMs have aggressively sought to stymie for two decades while against all odds it has managed to carry at least 80 percent of all data traffic on mobile devices and to be an input into virtually every other product, service and connected home. If the sort of nonprofit advocates and academic experts who early on were virtually alone in urging that access to unlicensed spectrum expand in tandem with oligopoly control of exclusively-licensed spectrum for cellular networks are excluded from the Administration’s planning and consultative process for spectrum reallocation and sharing, the economy, low-income consumers, start-ups, anchor institutions, and the broader public interest will all suffer the long-term consequences.

Conduct an inventory of actual spectrum use in prime low- to upper-mid bands: There currently is a huge opportunity cost to regulators knowing the allocations – but not the actual use – of spectrum they manage. In our comments on the NSS, PISC proposed that the Strategy

include a plan and timeline to conduct an inventory of *actual spectrum use* in prime low to upper-mid bands.

A core challenge for spectrum policy today is that in low- and mid-band frequencies (certainly below 16 GHz) every band is assigned and occupied to some degree; every incumbent believes its use of the band serves an important, sometimes crucial public purpose (and often this is true); and, despite this, the vast majority of the spectrum capacity in the band is unused at most times and in most places. While tables of allocations and databases documenting assignments are available, regulators are mostly flying blind with respect to the degree to which each band of spectrum is actually in use (or not), including where, when, at what power levels and for what purposes. The Table of Allocations is conceptually designed as a sort of property map—it tells us what types of services can operate where—but it is nearly useless when it comes to understanding actual use and the opportunities for repurposing and sharing.

In short, there is a huge opportunity cost to what NTIA and the FCC do not know about the actual use of spectrum they manage. NTIA periodically studies bands, but the agency's Spectrum Use Reports only cover bands up to 7.125 GHz and don't seem to have been updated since 2015.¹⁸ They also don't account for actual use. Similarly, the FCC's Spectrum Dashboard was a breakthrough a decade ago—but it is basically a mapping of assignments (not actual use), it only covers spectrum up to 3.7 GHz, and it no longer appears to receive updates. On a more comprehensive basis, the Universal Licensing System can tell us what licensees have been assigned rights to operate on particular frequencies and within certain (typically overly large) geographic areas, but it neither reports actual use nor cessation of use.

Accordingly, we recommend that the Implementation Plan include a timeline to conduct a spectrum inventory of actual use in prime low to upper-mid bands. It can begin with a modest range of frequencies if appropriate, perhaps initially up to 16 GHz. If the initiative is transparent and invites public input, much of the information (e.g., spectrum usage measurements) could be crowdsourced by the private sector. Incumbents should be strongly encouraged to provide missing data; and, ideally, any presidential order to implement the NSS should require it.

¹⁸ See <https://ntia.gov/other-publication/Federal-government-spectrum-compendium>.

Pillar Three: Technology Development

OTI, PK & SHLB fully agree with the Administration that “[i]mproving the efficient and effective use of spectrum requires enhancing the frameworks, processes, and tools for spectrum access and management.”¹⁹ We further agree that “[a]dvanced technologies can play a crucial role in enabling real-time, dynamic spectrum sharing and coexistence, as well as facilitating intelligent spectrum management.”²⁰ More specifically, we urge NTIA to prioritize its stated goal in the Strategy to “work[] with Federal agencies [to] continue to pursue development of an enduring, scalable mechanism to manage shared spectrum access, including through the development of a common spectrum management platform.”

In our joint comments with PISC, our groups strongly endorsed NTIA’s proposal to develop a federal **Incumbent Informing Capability** that can facilitate more intensive sharing both among federal agencies and with private sector uses. NTIA describes the IIC as “a mechanism for more reliably informing ‘new entrants’ in a shared spectrum band when incumbent federal systems are operating in close proximity and thus need to be protected.”²¹ PISC strongly agrees with NTIA that it should be a priority to create a government-side SAS with “the capability to evolve over time toward a dynamic spectrum sharing paradigm in selected bands where ‘everyone informs,’” and aligns with the agency’s Vision Statement of “anytime anywhere access to spectrum for all users.”²²

Accordingly, **we urge the Administration to endorse and establish a rapid implementation timeline for NTIA’s proposal to develop a Federal Incumbent Informing Capability** that can facilitate more intensive sharing both among Federal agencies and with private sector uses. We recommend that NTIA establish an aggressive implementation timeline for standing up a Federal IIC that will include actual use data and scheduling inputs, as needed, from all Federal agencies that will be able to coexist in bands shared with non-Federal users, including both CBRS (to improve upon and eventually replace reliance on the ESC network) and new bands identified for shared use (particularly the lower 3 GHz and 7/8 GHz bands).

¹⁹ Strategy at 13.

²⁰ *Ibid.*

²¹ Michael DiFrancisco, Edward Drocella, Charles Cooper and Paul Ransom, “Incumbent Informing Capability (IIC) for Time-Based Spectrum Sharing,” National Telecommunications and Information Administration (NTIA)—Office of Spectrum Management (Feb. 22, 2021), available at <http://tinyurl.com/unsdfskk>.

²² *Id.* at 7.

The timeline for an IIC should aim to have a working prototype for use in at least the CBRS band within one year, with testing and implementation completed within two years. This timeline would put this new technical capacity on track to promote robust sharing in any of the five bands identified for in-depth study and referral to the FCC for further proceedings within that same two-year time frame. If new funding is required, the Administration should make it a priority to include this provision in the legislation to renew the FCC’s auction authority, since passage of the Spectrum Innovation Act of 2022 in the U.S. House demonstrates strong bipartisan support for this approach.²³

Additionally, **we urge NTIA to make fuller use of the Institute for Telecommunications Science by adopting a public interest research agenda.** Advocacy organizations do not have the resources to pursue necessary spectrum research. While some universities receive grant money from institutions such as the National Science Foundation, this is extremely limited. Corporations and their trade associations engage in valuable research, but only where this research shows a clear path to potential profit under their existing business model. This severely limits the nature of spectrum research – and therefore the capacity for development of new spectrum technologies.

NTIA could establish an advisory board of nonprofit advocacy organizations to create a genuine public interest research agenda for ITS. To the extent resources are available, this would help to guide research into potentially groundbreaking new technologies that private interests have no immediate incentive to pursue. As with other cases of government funded and government initiated basic research, the private sector will inevitably follow with new investment after initial research proves the viability of a new approach.

To be clear, these need not be “moonshots” looking to invest billions of dollars. For example, the cost of initial research leading to the current Part 15 rules in the 1980s represented a tiny fraction of the value we now derive from the availability of unlicensed spectrum. A directed public interest research agenda could yield significant results in both the short term and the long term utilizing the existing ITS resources.

²³ In 2022 a provision funding the creation of the IIC, along with a requirement that federal spectrum users supply it with operational information, passed the U.S. House as part of a larger bill to renew FCC auction authority. *See* Spectrum Innovation Act of 2022, H.R. 7624, 117th Congress (2021-22), passed July 27, 2022.

Pillar Four: Spectrum Expertise and Public Awareness

The NSS properly identifies that in addition to the “spectrum pipeline,” we need a “workforce pipeline.” This includes not simply a need for tower climbers and construction workers that trade associations have identified repeatedly as needed for deployment. Every aspect of the spectrum talent pipeline – whether in engineering research, in public policy advocacy, or in federal agencies, needs fresh blood. At a time when cutting edge research demands new training and fresh perspective, we have fewer and fewer young people pursuing spectrum-related careers.

Additionally, there is a desperate need to expand diversity and representation in these spectrum fields. The spectrum workforce is predominantly white, male and graying. This is not only unsustainable in the long-term, it severely limits innovation by creating a self-reinforcing monoculture.

NTIA’s proposed workforce plan should consider the following specific steps:

Create a Workforce Task Force with Diverse Representation to develop the workforce plan. Pillar #4 is the most innovative and public policy-oriented Pillar because it goes beyond traditional federal and private sector concerns. As a result, it is the Pillar most likely to be neglected. But neglecting this would be a huge mistake. While the NSS is about securing our spectrum future generally, Pillar #4 is about securing a healthy spectrum industry needed to build that future. The NTIA proposed workforce plan requires specific steps to make it a reality, not simply general hortatory urging to the collaborative framework. We strongly urge NTIA to create a task force to create a concrete plan.

A task force to create a diverse spectrum workforce pipeline must itself be diverse to succeed. This of course means racial, ethnic and gender diversity. But it should also include representatives from specialties outside spectrum, such as education and workforce training. The taskforce should have representation from the private sector, the civil rights community, and the advocacy community generally.

Outreach to Historically Black Colleges and Universities. For the last 2 years, Public Knowledge has engaged with a number of other organizations and Howard University to inform engineering students at Howard about the possibilities in a carrier in spectrum engineering and telecommunications policy generally. NTIA could dramatically expand this effort, as could other federal agencies, by direct outreach.

Outreach to Tribes and Tribal Allies. Federal grant money and access to new spectrum in the CBRS and 2.5 GHz bands have encouraged Tribal entities and allies to train members to build and operate wireless networks. In addition to working with organizations to expand these efforts to enhance Tribal connectivity, they may provide opportunities for federal recruitment or recruitment by private sector companies (especially federal contractors). This outreach should go hand-in-hand with the inclusion of Tribes as stakeholders in the spectrum policy process.

Programs designed for high school education. Almost everyone uses wireless technologies on a daily basis. But the average member of the public has no idea about the underlying principles or even the basics of the technology. To feed the spectrum workforce pipeline, people from a young age need to understand that spectrum is not magic or something for a select few. Previous generations before the Internet would “catch the bug” by playing with sets from Radio Shack or using Ham Radio to speak to people around the world. Young people today need both sources of inspiration and ways to “scratch the itch” once inspired.

Federal programs can provide such sources of inspiration and a pathway to a career in the spectrum workforce. This could include partnering with other organizations. The Boy Scouts, for example, offer a merit badge in radio.²⁴ 4-H clubs have a long history of radio.²⁵ These have traditionally focused on broadcast radio and ham radio, but could become partners in educating and encouraging young people to look at cutting edge spectrum technologies.

These are only a few possibilities the proposed federal task force should explore in considering how to develop the needed spectrum workforce pipeline. Critically, this should not be viewed as a short-term project to ensure a suitable number of workers for 6G deployment. It must be a broad effort to ensure a diverse workforce for our spectrum future.

²⁴ <https://www.scouting.org/merit-badge-radio/>

²⁵ <https://4-hhistorypreservation.com/History/Radio/>

We commend NTIA for its thoughtful and successful effort in fashioning a comprehensive National Spectrum Strategy. Our groups stand ready and eager to assist the Administration and FCC with its implementation in any way we can.

Respectfully submitted,

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